

WHAT IS CLAIMED IS:

- 1                   1.       A gas distribution face plate comprising:  
2                   a face plate body having a thickness defining a number of inlet orifices having  
3 a width and a depth, at least one of the number, the width, and the depth configured to create  
4 a uniform pressure drop of between about 0.8 and 1 Torr across edge and center regions of  
5 the faceplate as gas is flowed through the inlet orifices, whereby a thickness of material  
6 deposited at an edge of a wafer varies by 3% or less from a thickness of material deposited at  
7 a center of the wafer, when the wafer is separated from the face plate by a gap of between  
8 about 75 and 450 mils.
- 1                   2.       The face plate of claim 1 wherein the orifice width comprises between  
2 about 0.010" and 0.018".
- 1                   3.       The face plate of claim 1 wherein the number comprises between about  
2 2000 and 17500 orifices.
- 1                   4.       The faceplate of claim 3 wherein the number comprises about 10000  
2 and the face plate is configured to process a wafer having a diameter of about 300 mm.
- 1                   5.       The faceplate of claim 3 wherein the number comprises about 5000  
2 and the face plate is configured to process a wafer having a diameter of about 200 mm.
- 1                   6.       A method of depositing on a semiconductor wafer, a layer of material  
2 having a center-to-edge thickness variation of 3% or less, the method comprising:  
3                   providing a gas distribution faceplate having a thickness and defining a  
4 number of inlet orifices having a width and a depth, at least one of the orifice number, width,  
5 and depth configured to create a uniform pressure drop of between about 0.8 and 1 Torr as  
6 gas is flowed through edge and center regions of the faceplate;  
7                   providing a semiconductor wafer separated from the gas distribution faceplate  
8 by a gap; and  
9                   flowing a gas through the faceplate body and across the gap to deposit the  
10 layer of material on the wafer.
- 1                   7.       The method of claim 6 wherein the semiconductor wafer is provided at  
2 a gap of between about 75 and 450 mils.

1                   8.       The method of claim 6 wherein the faceplate body is provided with  
2 orifices having a width of between about 0.010" and 0.018".

1                   9.       The method of claim 6 wherein the face plate body is provided with  
2 between about 2000 and 17500 orifices.

1                   10.      The method of claim 9 wherein a 300 mm diameter wafer is provided,  
2 and the faceplate is provided with about 10000 orifices.

1                   11.      The method of claim 9 wherein a 200 mm diameter wafer is provided,  
2 and the faceplate is provided with about 5000 orifices.

1                   12.      A method of promoting deposition of material of uniform center-to-  
2 edge thickness on a semiconductor wafer, the method comprising:  
3                   constricting a flow of deposition gas through a gas distribution faceplate, such  
4 that a resulting pressure drop across the faceplate creates a low pressure region over a wafer,  
5 gas velocities in the low pressure region over a wafer center and a wafer edge sufficiently  
6 uniform to result in deposition of a layer of material having a center-to-edge thickness  
7 variation of 3% or less.

1                   13.      The method of claim 12 wherein the resulting pressure drop is between  
2 about 0.8 and 1.0 Torr.

1                   14.      The method of claim 12 wherein the semiconductor wafer is provided  
2 at a gap of between about 75 and 450 mils from the faceplate.

1                   15.      The method of claim 12 wherein the deposition gas flow is constricted  
2 by faceplate orifices having a width of between about 0.010" and 0.018".

1                   16.      The method of claim 12 wherein the deposition gas flow is constricted  
2 by faceplate orifices numbering between about 2000 and 17500.

1                   17.      The method of claim 16 wherein the deposition gas flow is constricted  
2 by about 10000 orifices and the material is deposited on a 300 mm diameter wafer.

1                   18.      The method of claim 16 wherein the deposition gas flow is constricted  
2 by about 5000 orifices and the material is deposited on a 200 mm diameter wafer.